

AERIAL SURVEY OF EMPEROR GEESE AND OTHER WATERBIRDS  
IN  
SOUTHWESTERN ALASKA,  
FALL 2004

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Key Words: aerial survey, emperor geese, waterbirds, southwest Alaska.

December 2004

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# AERIAL SURVEY OF EMPEROR GEESE AND OTHER WATERBIRDS IN SOUTHWESTERN ALASKA, FALL 2004

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**Abstract:** The fall aerial emperor goose survey was conducted in southwest Alaska for the 26<sup>th</sup> consecutive year in 2004. Emphasis was on emperor geese, Pacific brant, Canada geese, and Steller's eiders with populations estimated at 93,544, 135,203, 43,602, and 79,003, respectively. The survey was flown from 30 September to 3 October 2004 from Kuskokwim Bay to Wide Bay, along the north and south sides of the Alaska Peninsula. An amphibious Cessna 206 (N234JB), with a left seat pilot/observer and right seat observer, was flown at 45 m (150 feet) ASL and 200 km/hr (110 kts) along the coastline and over estuaries to determine species composition and numbers of birds. Two additional replicate surveys of the Izembek NWR area were flown on 7 October to estimate sizes of the Pacific brant and Canada goose populations. The averages of the three surveys were 134,475 (Pacific brant) and 40,052 (Canada geese).

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## INTRODUCTION

This survey has annually monitored fall distribution, abundance and population trends of emperor geese and other waterbirds at migratory staging areas throughout southwest Alaska since 1979. Data from this survey are used to expand photographic estimates of emperor goose productivity (i.e. percent juveniles) based on the proportional distribution of the population at various fall staging locations. The survey includes coastline and estuarine habitats from Kuskokwim Bay south and west along the north side of the Alaska Peninsula to Unimak Island, and the south side of the Alaska Peninsula east to Wide Bay.

## METHODS

The survey was flown using an amphibious Cessna 206 (N234JB) at a ground speed of approximately 200 km/hr (110 kts) and an altitude of 45 m (150 feet) ASL. The 2004 survey route followed the coast from Jacksmith Bay (on the southeast coast of Kuskokwim Bay) to the lower Naknek River (near the village of King Salmon) to the tip of the Alaska Peninsula (along the north side of the Alaska Peninsula) to Wide Bay (along the south side of the Alaska Peninsula). Observations were made from both sides of the aircraft and voice recorded into two laptop computers using remote microphones. Computers received input from the aircraft Global Positioning System (GPS) saving coordinates for each observation. Special "Record" and "Transcribe" computer programs developed by Jack Hodges (USFWS-MBM, Juneau) were used to collect and process these data.

The coastal flight path was usually 100 m offshore with deviations to confirm species identification and numbers, normally within 1.6 km (1 mile) of exposed shorelines. In estuaries, a systematic but meandering flight path was followed on a computer moving map program to ensure complete coverage. Whenever possible, flights were conducted with <20 knots of wind and primary staging areas were flown at or near high tide as this concentrated emperor geese near shorelines.

The greater survey area includes 143 shoreline/estuarine segments (Figures 1-2) which were previously described by Mallek and Dau (2000). Segments 14-22 and 29-34 were flown on 30 September. Segments 23-28 were not flown due to local high winds however, we don't believe skipping these segments affected estimates of population size or distribution as few if any emperor geese have been seen in these segments during previous surveys. Segments 35-59 were flown on 1 October; segments 60-68, 79-81, and 83-85 were flown on 2 October; and most of segments 86-137 were flown on 3 October. The south side of the Alaska Peninsula (segments 86-137) is filled with many deep rocky bays and points which were not surveyed due to time and fuel constraints however previous complete surveys have indicated few if any emperor geese use these areas. Two additional surveys of Izembek Lagoon and other estuaries adjacent to Izembek NWR were flown on 7 October (Mallek/Dau and Larned/Anderson). General observations of habitat and survey conditions including wind speed and direction, temperature, sky condition, visibility, and tide stage were recorded en route.

## SURVEY CONDITIONS

30 September: North winds of approximately 10 knots increased to 20 knots during the day. Segments 23-28 were omitted due to local northwest winds of 25-30 knots. Sky conditions were 1,500 feet scattered to overcast with good visibility throughout the day with the exception of moderate glare to the west on segments 29-33. Air temperature was 32°F at the start of the survey.

1 October: North winds of 10 to 25 knots persisted during the day. Sky conditions were clear with unrestricted visibility initially, becoming 3,000 feet scattered by mid-day. Air temperature was 32°F at the start of the survey. Tides were low in Egegik and Ugashik bays, there were mid, flooding tides from Cinder River to Port Heiden. Tides were high in Port Moller and Nelson Lagoon.

2 October: Winds were 20 knots from the northwest increasing to 25 knots at the end of the day. Sky conditions were 3,000 feet overcast, visibility was good and air temperature was 40°F throughout the day. Tides were high in Izembek Lagoon, Kinzarof Lagoon, Morzhovoi Bay, and Bechevin Bay.

3 October: Light south winds of 5-8 knots persisted throughout the day. Sky conditions were generally 3,000 feet overcast, occasionally lowering to 500 feet overcast. There was occasional mist but overall, visibility was good and temperature at the start of the survey was 40°F.

7 October: Winds were 15 knots from the northwest, sky conditions were 2,500 feet overcast, visibility was good, and air temperature was 40°F throughout the day. Light rain was encountered over Cold Bay and Kinzarof Lagoon. Tides were low in Izembek Lagoon, mid-level in Kinzarof Lagoon, and high in Morzhovoi and Bechevin bays.

## RESULTS/DISCUSSION

The totals for all species observed during the survey are summarized in Table 1. Figure 3 depicts the 26-year trend for fall staging emperor geese. Previous estimates of emperor geese (1979-2004) and corresponding 3-year averages are summarized in Appendix 1.

### Emperor Goose

We estimate the fall emperor goose population at 93,544 birds. The 2004 population estimate is 21% above the 2003 estimate of 77,290 and the current 3-year average of 83,175 is 16% above the previous 3-year average (71,990). Numbers and proportions of emperor geese at primary staging sites were as follows: Egegik Bay 609 (<1%, segments 36-37); Ugashik Bay 867 (<1%, segment 38); Cinder River Estuary 30,342 (32%, segments 40-42); Port Heiden 11,273 (12%, segments 44-46); Seal Islands 20,085 (21%, segment 47); Nelson Lagoon 18,159 (19%, segments 551-552, 56-57); Izembek Lagoon and adjacent estuaries 5,502 (6%, segments 60-65, 67-68, 79-81, 83-85); Canoe Bay 537 (<1%, segment 93); Chignik Lagoon 399 (<1%, segment 125); and Wide Bay 904 (<1%, segment 137).

### Pacific Brant

A total of 135,203 Pacific brant was observed during the 30 September to 3 October emperor goose survey of which >99% (135,140) were in Izembek Lagoon and adjacent estuaries. The replicate surveys of Izembek Lagoon and adjacent estuaries (two surveys flown on 7 October) provided counts of 105,804 and 162,479. The average of the three surveys of the Izembek area was 134,475. This average is 1% below the 2003 fall average of 135,944 (n=5 surveys) and 5% above the 30-year average peak fall count of 127,974 (1975-2004, Izembek NWR files).

### Canada Goose

We observed 43,602 Canada geese during the 30 September to 3 October emperor goose survey. Izembek Lagoon and adjacent estuaries accounted for approximately 69% (29,920) of the survey total. The low count of Canada geese during the emperor goose survey around the Izembek area (2 October) can be attributed to high tides during that survey, which resulted in many Canada geese leaving the lagoon to feed in uplands. Replicate surveys of Canada geese in the Izembek area (two surveys flown on 7 October) provided counts of 40,982 and 49,252. The average of the three surveys of the Izembek area was 40,052 Canada geese. This average was 22% above the 2003 fall average (32,886, n=5 surveys) and 7% below the 30-year average peak fall count of 43,265 (1975-2004, Izembek NWR files).

### Steller's Eider

We observed a total of 79,003 Steller's eiders during the 30 September to 3 October emperor goose survey. Numbers and proportions of Steller's eiders at primary staging sites were as follows: Chagvan Bay 1,743 (2%, segment 20); Cinder River Estuary 1,600 (2%, segments 40-42); Port Heiden 8,410 (11%, segments 44-46); Seal Islands 11,615 (15%, segment 47); Nelson Lagoon 42,201 (53%, segments 551-552, 56-57); and Izembek Lagoon and adjacent estuaries 11,440 (14%, segments (60-65, 67-68, 79-81, 83-85). Replicate surveys for the Izembek area (two surveys flown on 7 October) provided counts of 5,387 and 7,095 Steller's eiders. The average of the three surveys of the Izembek area was 7,974 Steller's eiders. The average fall (September/October) population size for the Izembek area is 21,509 (1975-2004, range = 4,500-78,645, Izembek NWR files).

## ACKNOWLEDGMENTS

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Figure 1. Map of emperor goose aerial survey segments 1-36 in southwest Alaska, 1992-2004.

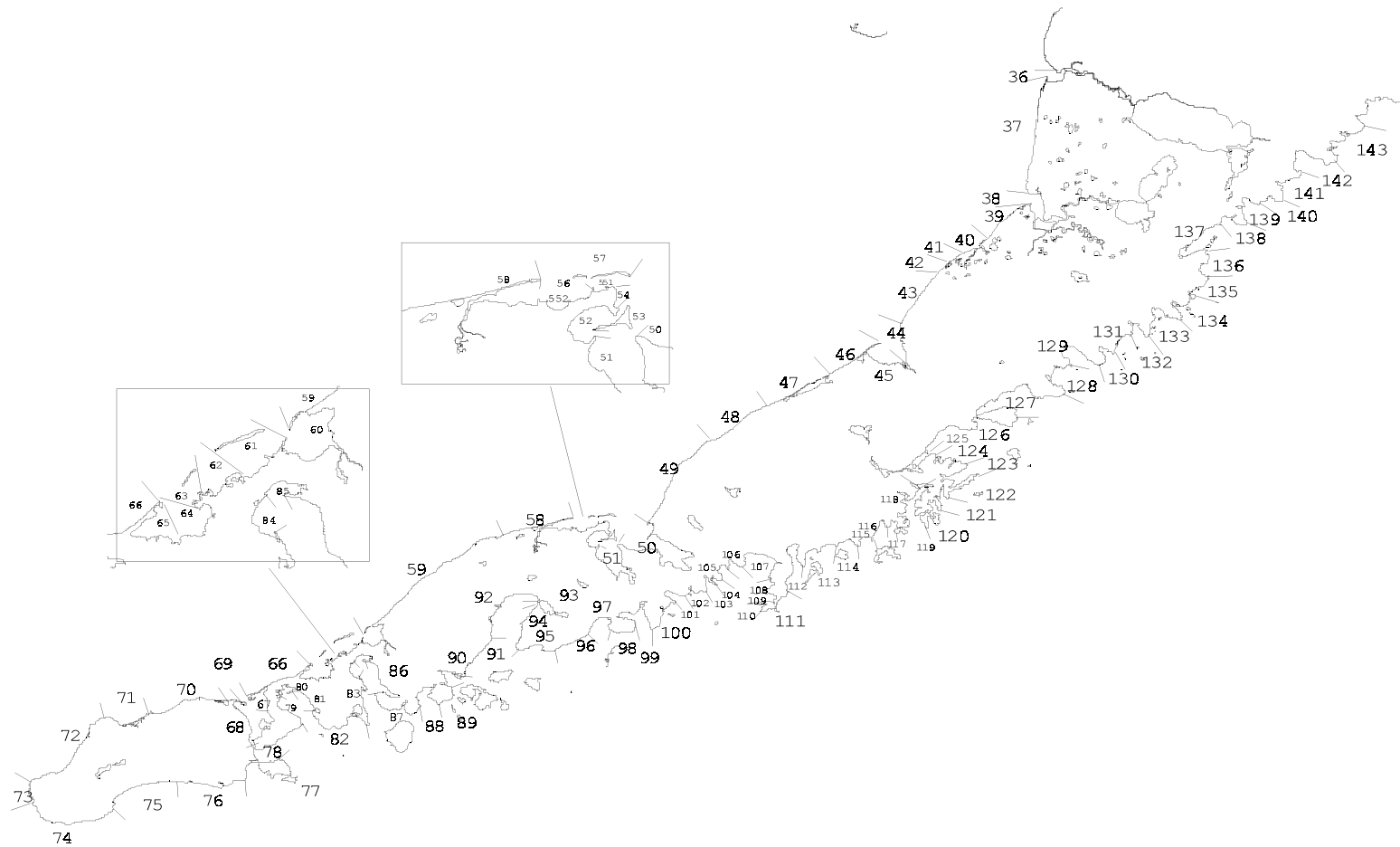


Figure 1 (continued). Map of emperor goose aerial survey segments 36-143 in southwest Alaska, 1992-2004.



Table 1. Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	14	15	16	17	18	19	20	22	29	30	31	32	33
American Green-winged Teal													
American Wigeon	10						250						
Bald Eagle								2		1		1	
Brown Bear		1											
Beluga Whale										73	16	13	
Black Scoter	2	35	363		7	10		8	45	38		559	
Bonaparte's Gull													
Bufflehead													
Canada Goose	20				15		2605	3960		70		140	
Common Eider			24			15							
Common Loon													
Murre													
Common Raven								2					
Cormorant	1				1								
Emperor Goose				4	4								
Gadwall													
Greater Scaup			304		3301	8	1745				2442	500	
Gyr Falcon													
Harlequin Duck													
Harbor Seal						375		675					
King Eider		310											
Large Gull	77	123	141	393	207	100	439	162	894	574	475	2917	70
Large Shorebird													
Long-tailed Duck													
Mallard	10	5											
Moose													
Northern Pintail	673	80	775		1001		2190	1535		176	405	185	
Orca													
Pacific Brant								20					
Pacific Loon		1					1				1		
Pigeon Guillemot										20			
Porpoise													
Red-breasted Merganser		4											28
Red-necked Grebe			3		1				8	1			
Red-throated Loon									3	1		1	
Sabine's Gull													
Sea Otter													
Small Gull	138	5	37		7			82	89	411	93	2361	96
Small Shorebird	315	45	95	45	1300			1200		2145	425	17600	55
Snow Goose												60	
Steller's Eider					115		1743						
Surf Scoter			81		5								
Tundra Swan						2			2				
Walrus													
White-winged Scoter			7		3	1			36				
Yellow-billed Loon													

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	34	35	36	37	38	39	40	41	42	43	44	45	46
American Green-winged Teal													
American Wigeon													
Bald Eagle							6			2			
Brown Bear													1
Beluga Whale													
Black Scoter		495	151	305	27	123	80			50	2	5	1425
Bonaparte's Gull													
Bufflehead													
Canada Goose			65		195		12			35	70	842	3850
Common Eider												15	
Common Loon													
Murre													
Common Raven			1										
Cormorant							60			10		8	1
Emperor Goose		22	607	2	867		26257		4085	7	1846	7417	2010
Gadwall													
Greater Scaup		95	485		3		100					300	
Gyrfalcon													
Harlequin Duck													
Harbor Seal		200			3								
King Eider				352									
Large Gull	50	268	1114	93	2334	27	1054	10	230	49	180	1524	12
Large Shorebird					15								
Long-tailed Duck													
Mallard			560		185		370				24	652	
Moose				1									
Northern Pintail			3530	341	6905		7585			45	761	19565	2380
Orca													
Pacific Brant													
Pacific Loon		4											
Pigeon Guillemot													
Porpoise													
Red-breasted Merganser		5					5						
Red-necked Grebe				5		1				3			20
Red-throated Loon													
Sabine's Gull													
Sea Otter						1		1					
Small Gull	15	504	1932	329	895	77	1676			538	220	1980	102
Small Shorebird			2340	30	9470		9400				20	12895	8
Snow Goose		75	210	150	29								
Steller's Eider							1600					7810	600
Surf Scoter		12		40						45			
Tundra Swan			2										
Walrus													
White-winged Scoter			155	166		5	50	2	5	222			
Yellow-billed Loon													

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	47	48	49	50	51	52	53	54	551	552	56	57
American Green-winged Teal	150											
American Wigeon									10	50		
Bald Eagle			3		2	1	2		1			
Brown Bear	1	2	2									
Beluga Whale												
Black Scoter		840	146		258	2521	1				145	2600
Bonaparte's Gull												
Bufflehead												
Canada Goose	1093								62	20	25	
Common Eider										658	319	
Common Loon												
Murre												
Common Raven												
Cormorant		7	3	12			4			10	27	
Emperor Goose	20085			1192	667	1995			2335	8764	6945	115
Gadwall	20									10		
Greater Scaup	350								600		80	100
Gyr Falcon												
Harlequin Duck				31	8		4					
Harbor Seal			174							150		400
King Eider				1							170	
Large Gull	2395	4	43	1355	194	1410	4	23	256	4044	8640	250
Large Shorebird												
Long-tailed Duck												
Mallard	888								20			
Moose												
Northern Pintail	3726				200	253			790	4123		
Orca			1									
Pacific Brant												
Pacific Loon												
Pigeon Guillemot												
Porpoise												
Red-breasted Merganser				3					3		3	
Red-necked Grebe					1		8					
Red-throated Loon												
Sabine's Gull			2									
Sea Otter	1	1	2	113	76	130	28	26		2	751	3
Small Gull	90	15	1868	515	160	5				1023	638	320
Small Shorebird	15774			120		160			1350	3200	21075	
Snow Goose	45											
Steller's Eider	11615			400			29	1450	1558	15090	24923	630
Surf Scoter					15							
Tundra Swan	2					4	4					
Walrus			1701									
White-winged Scoter		22	4	99	95		35	6				
Yellow-billed Loon												

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	58	59	60	61	62	63	64	65	66	67	68
American Green-winged Teal											
American Wigeon											
Bald Eagle									1		
Brown Bear			2								
Beluga Whale											
Black Scoter	5								2062	3	
Bonaparte's Gull			100								
Bufflehead											
Canada Goose			15730	1830	772		300	3753			5150
Common Eider											
Common Loon											
Murre											
Common Raven											
Cormorant							1	4		129	
Emperor Goose		2	949	169	385	350				53	596
Gadwall											
Greater Scaup			195								
Gyr Falcon											
Harlequin Duck									64	10	
Harbor Seal		565			1						
King Eider											
Large Gull	165	233	825	4553	1050	1500	2518	853	622	49	342
Large Shorebird											
Long-tailed Duck											
Mallard			429								
Moose											
Northern Pintail			4500	700				1400		90	1800
Orca											
Pacific Brant			18604	42098	16698	11273	21938	13241		962	3085
Pacific Loon							1			6	
Pigeon Guillemot											
Porpoise										5	
Red-breasted Merganser			10	25						30	
Red-necked Grebe									10		
Red-throated Loon											
Sabine's Gull											
Sea Otter		412	92	48	197	4	70	20	32	133	21
Small Gull	32	393		128	513		625	775	100	1	1
Small Shorebird			100	4200							
Snow Goose											
Steller's Eider			4475	3005	3050	110		800			
Surf Scoter											
Tundra Swan			2								
Walrus											
White-winged Scoter				8					813		
Yellow-billed Loon											

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	79	80	81	83	84	85	86	88	90	91	92	93	97	99
American Green-winged Teal		100				50								
American Wigeon		50												
Bald Eagle			2	1			1		3	5	2	2	1	1
Brown Bear									3					
Beluga Whale														
Black Scoter			60	23	7	20	8	15	60	130	784	33		100
Bonaparte's Gull														
Bufflehead														20
Canada Goose		210				2175						351		
Common Eider														
Common Loon							8	4	4	5	4	3		5
Murre												1		
Common Raven							2							2
Cormorant	1		10	2		1	6		16	138	159	15		35
Emperor Goose	196	17	575	1820	190	202	50		16		446	537	25	
Gadwall														
Greater Scaup														
Gyr Falcon												1		
Harlequin Duck	3		5	34	52	24	134	13	169	11	111	263	9	335
Harbor Seal					85				13		125	106		5
King Eider														
Large Gull	22	2	185	192	32	437	419	917	2636	390	289	737	52	970
Large Shorebird														
Long-tailed Duck												5		
Mallard		5				50			70			90		
Moose														
Northern Pintail		540		285		225						400		
Orca														
Pacific Brant		1771				5470					43			
Pacific Loon							6		18	1		10		
Pigeon Guillemot														
Porpoise														
Red-breasted Merganser	237	125	32		64	485	104	106	775		668	921		184
Red-necked Grebe							3		3	86	346	219		284
Red-throated Loon														
Sabine's Gull												2		
Sea Otter	1		5	22	50	1	2		8		3	15		
Small Gull	10	3					64	368	1275	20	130	279	140	100
Small Shorebird							1							
Snow Goose														
Steller's Eider														
Surf Scoter											9	8		2
Tundra Swan										2				
Walrus														
White-winged Scoter				5	7		1	5	1	52	891	161		87
Yellow-billed Loon									2					1

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	101	102	103	104	105	106	107	112	113	114	115	116	117	118	125
American Green-winged Teal															
American Wigeon															250
Bald Eagle	2		2		5	3	4	6	3	1	3		2		1
Brown Bear		1													
Beluga Whale															
Black Scoter	82	2			115	40		25	10				1		107
Bonaparte's Gull															
Bufflehead															
Canada Goose															
Common Eider															
Common Loon	2					2	3		4	4					1
Murre			15				3							46	
Common Raven						1	1		1						
Cormorant	23	52	30	13	33	68	19	206	40	42	186	101	73	59	6
Emperor Goose								60							399
Gadwall															
Greater Scaup															1650
Gyr Falcon															
Harlequin Duck	99	15	4	4	14	7	42	7	12						167
Harbor Seal						10	70						3		
King Eider															
Large Gull	599	39	16	6	68	37	316	109	46	28	25	146	6	57	591
Large Shorebird															
Long-tailed Duck															
Mallard															1250
Moose												3			
Northern Pintail															625
Orca							6								
Pacific Brant															
Pacific Loon	1								2				5		5
Pigeon Guillemot															
Porpoise															
Red-breasted Merganser					23		50	10							310
Red-necked Grebe	47	2	11	2	20	5	19		32	5	36	40			2
Red-throated Loon							2								
Sabine's Gull															
Sea Otter							5		3	2					22
Small Gull		12	1		15		48	126	155	50	33	20	30	5	245
Small Shorebird															
Snow Goose															
Steller's Eider															
Surf Scoter					100		40	50			10				
Tundra Swan					7	1		4			3				2
Walrus															
White-winged Scoter	16	20	65	60	116	3	94	60	101		11	10	35		
Yellow-billed Loon															

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 30 September - 3 October 2004.

SPECIES	126	127	128	129	130	131	133	134	135	137	Grand Total
American Green-winged Teal											300
American Wigeon											620
Bald Eagle	2	2	3	5	3	2				7	96
Brown Bear	3			3		3				3	25
Beluga Whale											102
Black Scoter	89	12		20						570	14624
Bonaparte's Gull											100
Bufflehead											20
Canada Goose										252	43602
Common Eider											1031
Common Loon	2	7	4	4			5			5	76
Murre				1			2			5	61
Common Raven	2					2					14
Cormorant	11	30	14	15			5	2	2	28	1719
Emperor Goose	212	10	16	39	100					904	93544
Gadwall											30
Greater Scaup										230	12488
Gyr Falcon											1
Harlequin Duck	146	23	8	11						98	1937
Harbor Seal											2960
King Eider											833
Large Gull	649	115	44	134	56	120		20		438	55790
Large Shorebird											15
Long-tailed Duck											5
Mallard		3		7							4618
Moose		1									5
Northern Pintail										62	67851
Orca											7
Pacific Brant											135203
Pacific Loon	4		2								68
Pigeon Guillemot											20
Porpoise											5
Red-breasted Merganser			25	25						400	4660
Red-necked Grebe	10	17	225	7						223	1705
Red-throated Loon											7
Sabine's Gull											4
Sea Otter	35	9	1	79						21	2448
Small Gull	450	125	90	430	61	2	55	550		1250	24931
Small Shorebird											103368
Snow Goose										185	754
Steller's Eider											79003
Surf Scoter	20	10	15	26						511	999
Tundra Swan				2							39
Walrus											1701
White-winged Scoter	4	171								1567	5277
Yellow-billed Loon											3

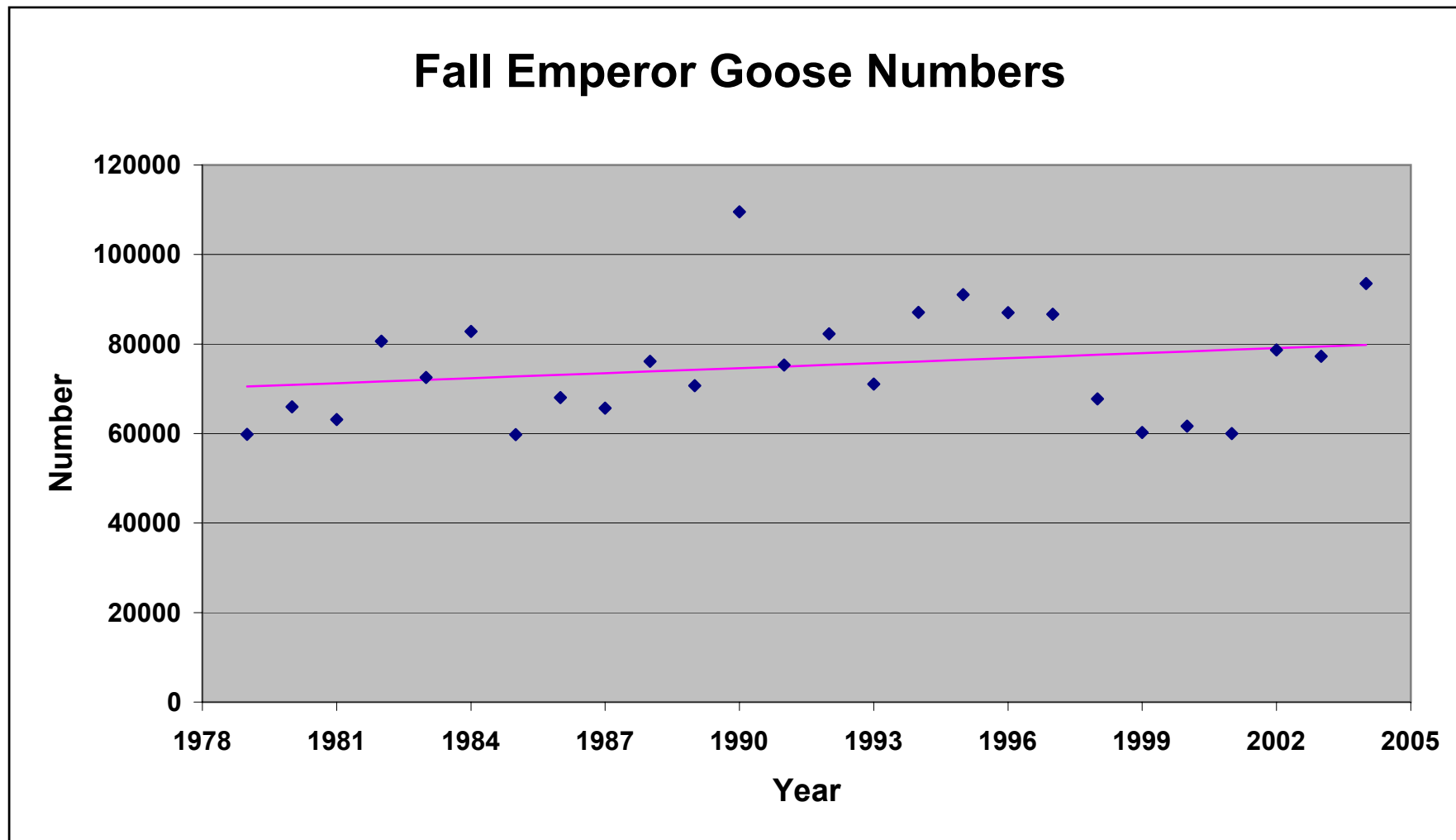


Figure 3. Twenty-six year trend of fall staging emperor geese in southwest Alaska. Mean = 75,169, P = 0.263.



Appendix 1. Emperor goose fall survey data, southwest Alaska, 1979-2004.

YEAR	TOTAL	3YR. AVERAGE	SURVEY DATES	OBSERVERS	SURVEY AREA
1979	59,808	NA	10/1-4	B. Conant/R.E. Gill, Jr.	South Alaska Peninsula missing
1980	65,971	NA	10/4-8	R.J. King/R.E. Gill, Jr.	North Alaska Peninsula only
1981	63,156	62,978	10/3-8	R.J. King/R.E. Gill, Jr./D.V. Derksen	All
1982	80,608	69,912	10/6-10	R.J. King/K.S. Bollinger	All
1983	72,551	72,105	10/10-16	R.J. King/D.V. Derksen	All
1984	82,842	78,667	10/3-8	R.J. King/D.V. Derksen	All
1985	59,790	71,728	10/10-14	R.J. King/W.D. Eldridge	All
1986	68,051	70,228	10/5-11	R.J. King/W.D. Eldridge	All
1987	65,663	64,501	10/2-5	R.J. King/W.D. Eldridge	All
1988	76,165	69,960	10/7-12	R.J. King/W.D. Eldridge	All
1989	70,729	70,852	10/7-12	R.J. King/L. Denlinger	All
1990	109,531	85,475	10/17-19	R.J. King/A.W. Brackney	All
1991	75,295	85,185	10/3-8	R.J. King/A.W. Brackney	All
1992	82,295	89,040	10/10-17	R.J. King/A.W. Brackney	All
1993	71,051	76,214	10/23-26	R.J. King/D.A. Dewhurst	Alaska Peninsula only
1994	87,086	80,144	10/8-14	R.J. King/K. Laing	All
1995	91,009	83,049	10/14-20	R.J. King/K.S. Bollinger	All
1996	87,018	88,371	9/28-29	R.J. King/W.D. Eldridge	North Alaska Peninsula only <sup>#</sup>
1997	86,669	88,232	10/3-5	R.J. King/C.P. Dau	North Alaska Peninsula only <sup>#</sup>
1998	67,744	80,477	10/7-9	R.J. King/E.J. Mallek	Alaska Peninsula only
1999	60,226	71,546	10/1-5	E.J. Mallek/C.P. Dau	North Alaska Peninsula only <sup>#</sup>
2000	61,626	63,199	10/1-5	E.J. Mallek/C.P. Dau	Kuskokwim Bay south
2001	59,987	60,613	9/26-10/1	E.J. Mallek/C.P. Dau	Kuskokwim Bay south
2002	78,692	66,768	9/29-10/2	E.J. Mallek/C.P. Dau	Kuskokwim Bay south
2003	77,290	71,990	9/27-10/2	E.J. Mallek/C.P. Dau	Kuskokwim Bay south
2004	93,544	83,175	9/30-10/3	E.J. Mallek/C.P. Dau	Kuskokwim Bay south

<sup>#</sup> Previous south side of the Alaska Peninsula used in estimate.